

May 2019 Board Meeting

Field Tour Itinerary

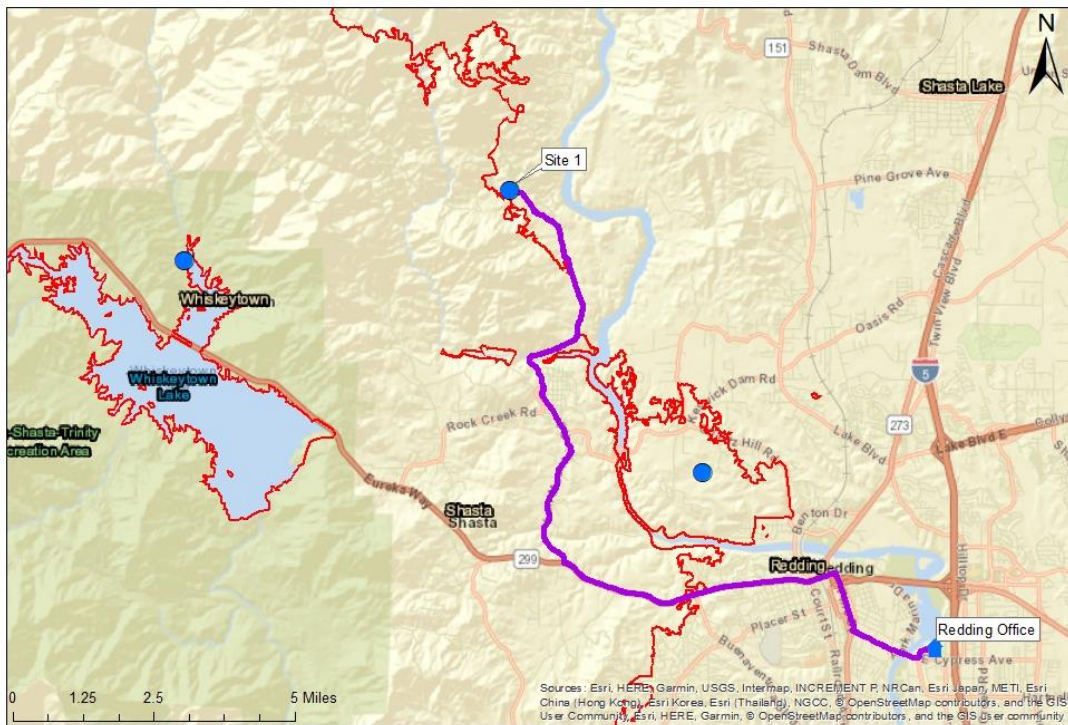
May 7, 2019



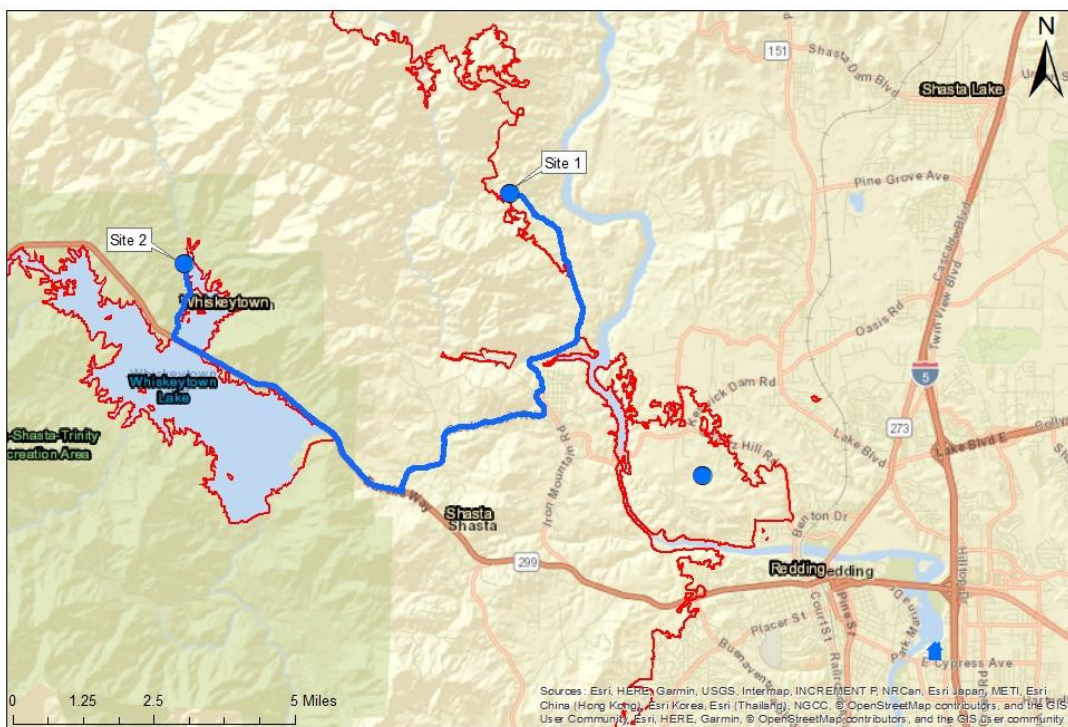
Time	Location	Topic	Details (Speakers)
0800	Redding Office 364 Knollcrest Dr. Ste 205 (Parking Lot)	Preparation for Activities Review Itinerary	Clint Snyder, Assistant Executive Officer, CVRWQCB - Introduction to the day's topics - Handout - Safety <i>Restrooms, Load Vehicles</i>
0830	Depart Redding Office	N/A	Drive 299W
0900 - 1130	Iron Mountain Mine (Site 1) 14000 Iron Mountain Rd Restricted Access: must be escorted by mine personnel	Iron Mountain Mine Water Quality	Kate Burger, CVRWQCB Lily Tavassoli, U.S. EPA
1200 - 1310	Whiskey Creek (Site 2)	Forest Health Discussion	Angela Wilson, CVRWQCB <i>Lunch, Restrooms</i>
1310 - 1330	Whiskey Creek (Site 2)	Carr Fire Surface Water Monitoring	Lynn Coster/Rebecca Tabor, CVRWQCB
1350 - 1430	Stanford Hills (Site 3)	Carr Fire Grant Implementation and Effectiveness Monitoring	Joe Karkoski, SWRCB Guy Chetelat, CVRWQCB Kelli England & Ross Perry, Western Shasta Resource Conservation District

Carr Fire Field Tour Stops

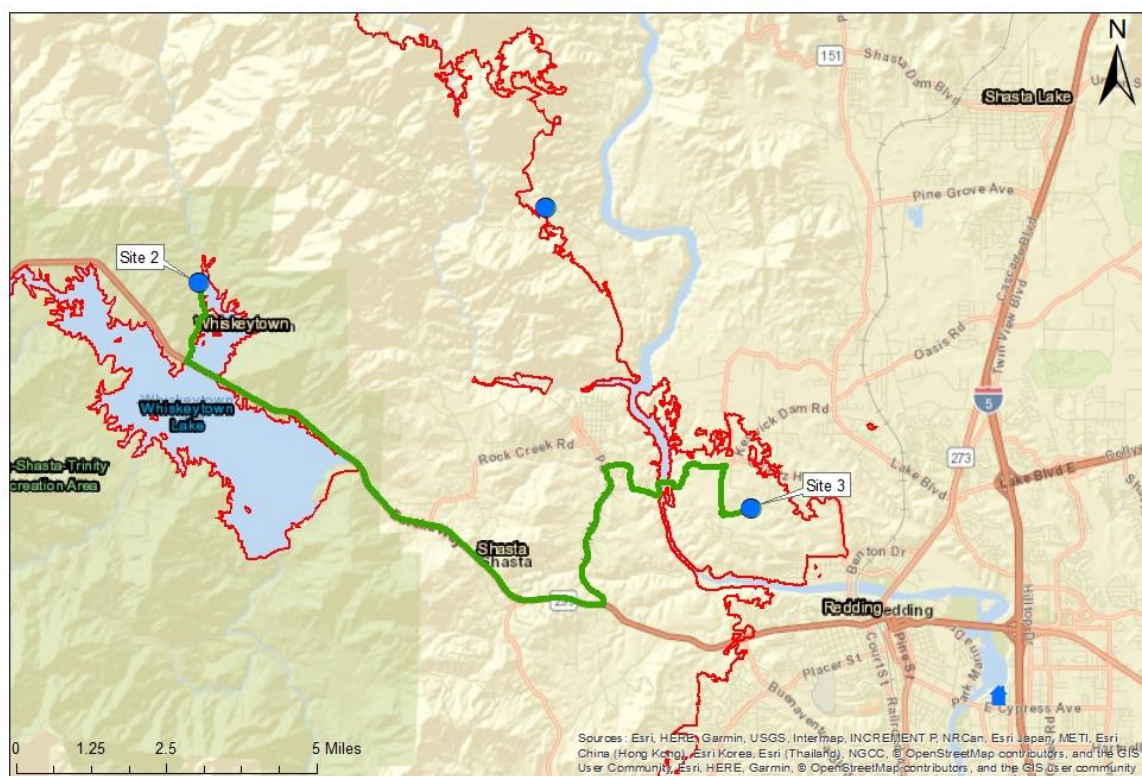
Directions from Redding Office to Site 1



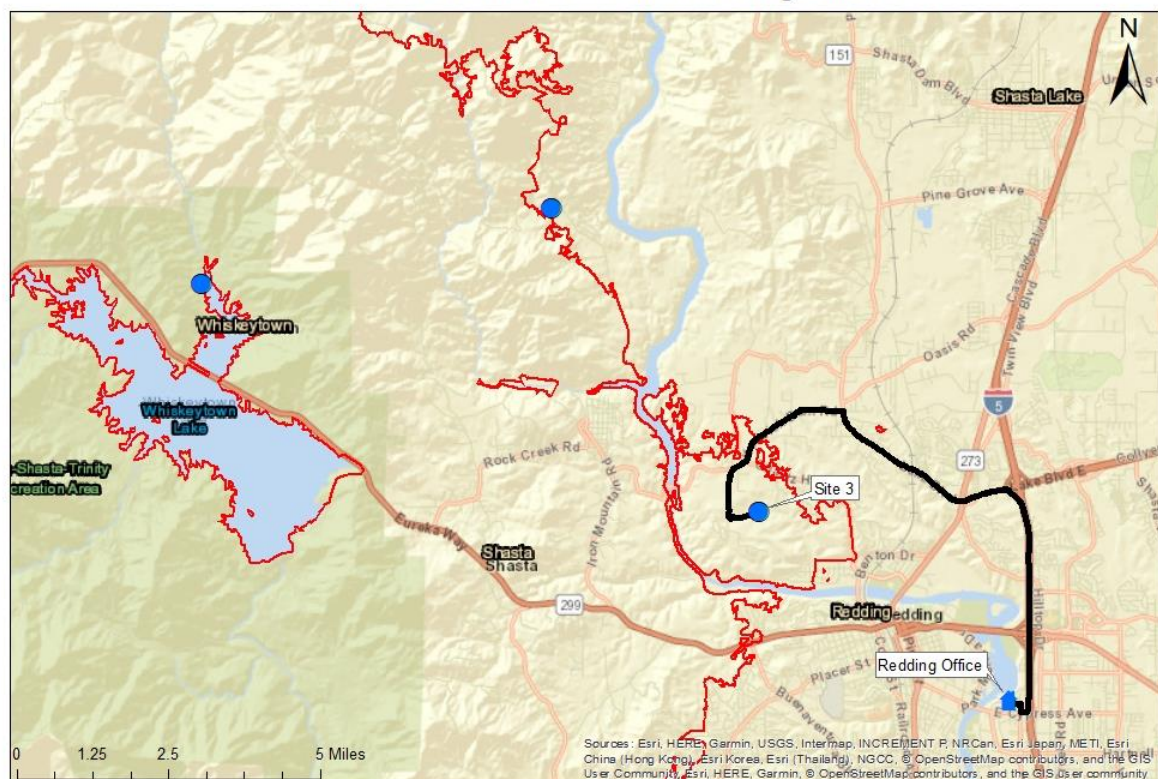
Directions from Site 1 to Site 2



Directions from Site 2 to Site 3



Directions from Site 3 to Redding Office



FIELD TOUR STOPS

1. IRON MOUNTAIN MINE

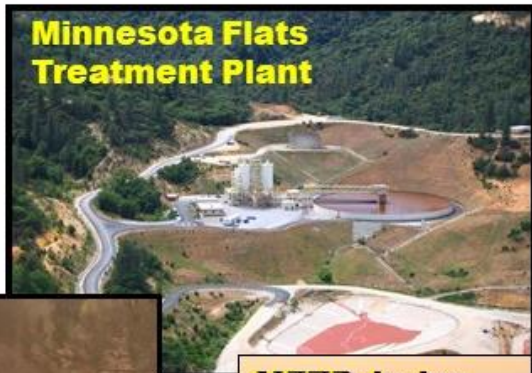
- Iron Mountain Mine (IMM) was once the largest industrial discharger of pollution into the surface waters of the United States. Three main creeks (Spring Creek, Boulder Creek, and Slickrock Creek) are impacted by acid mine drainage (AMD) from the mined areas. Prior to any response actions, six tons of metals were released into the Sacramento River every day.
- NPL listing and extensive enforcement has allowed for EPA and its partners to spend over 30 years investigating and cleaning up this toxic mine.
- Today, the site consists of a complex, engineered remedy that effectively treats over 275 million gallons of highly contaminated water every year and prevents impacts to the Sacramento River, a critical component of California's water supply and crucial habitat for California's salmon population.

Stop 1 – Minnesota Flats Treatment Plant (MFTP) Overlook

The MFTP is the heart of the IMM cleanup and treats the four main sources of AMD that are collected, stored and treated at the Site.

- Treats 50 to 6,000 gallons per minute (gpm) of AMD
- Requires continuous lime deliveries for treatment process
- Plant operations: 16 full time staff, 100+ contractors, \$6-10M/yr
- What's unique? Scale and magnitude of operation

Minnesota Flats Treatment Plant



Richmond Mine portal during Carr Fire



Stop 2 – Richmond Mine

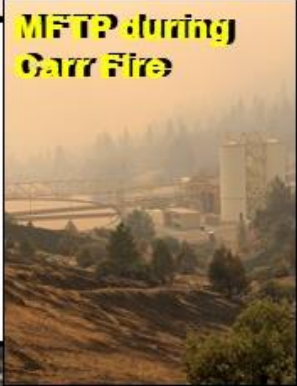
The Richmond mine portal is the main haulage level of over 25 miles of underground mine workings.

- World's lowest recorded pH
- Produces AMD from 16 gpm to >1,500 gpm
- Annual muck removal
- Significant Carr Fire impacts

AMD Conveyance Pipeline



MFTP during Carr Fire

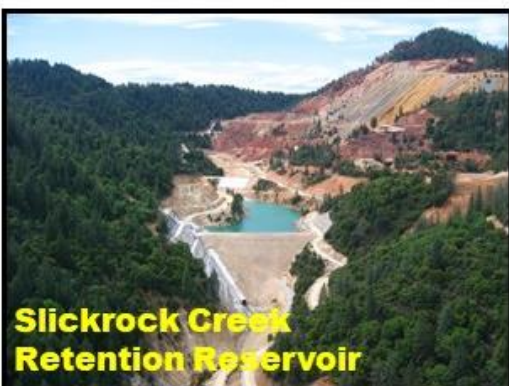


Stop 3 – Brick Flat Pit (BFP) Dam and Landfill

BFP dam stores treated sludge from the MFTP. Sludge is hauled up the Mountain once per year after drying out in the four sludge drying beds at the MFTP area.

- CERCLA has a preference for on-site management of contamination
- Approximately 75 feet of sludge stored in the pit right now
- Dam will be raised at least one more time to create more capacity

Brick Flat Pit



Slickrock Creek Retention Reservoir

Stop 4 – Slickrock Creek Watershed Overview

The Slickrock Creek retention reservoir collects AMD discharges for treatment at the MFTP treatment plant.

- 220 acre-foot retention reservoir
- Collects all of Slickrock Creek area AMD which comprised 60 to 70% of copper load associated with previously uncontrolled IMM discharges
- Clean water diversion away from mine-impacted areas

2. FOREST HEALTH DISCUSSION **AND LUNCH** (Site 2 – Whiskey Creek)

While the Board will be spend much of the day focusing on the effects of catastrophic wildfire, we'll spend some time during the lunch hour discussing some of the measures being taken to better position the state for future wildfire events. Topics will include:

- Forest Management Task Force
- SB 901
- AB 2551

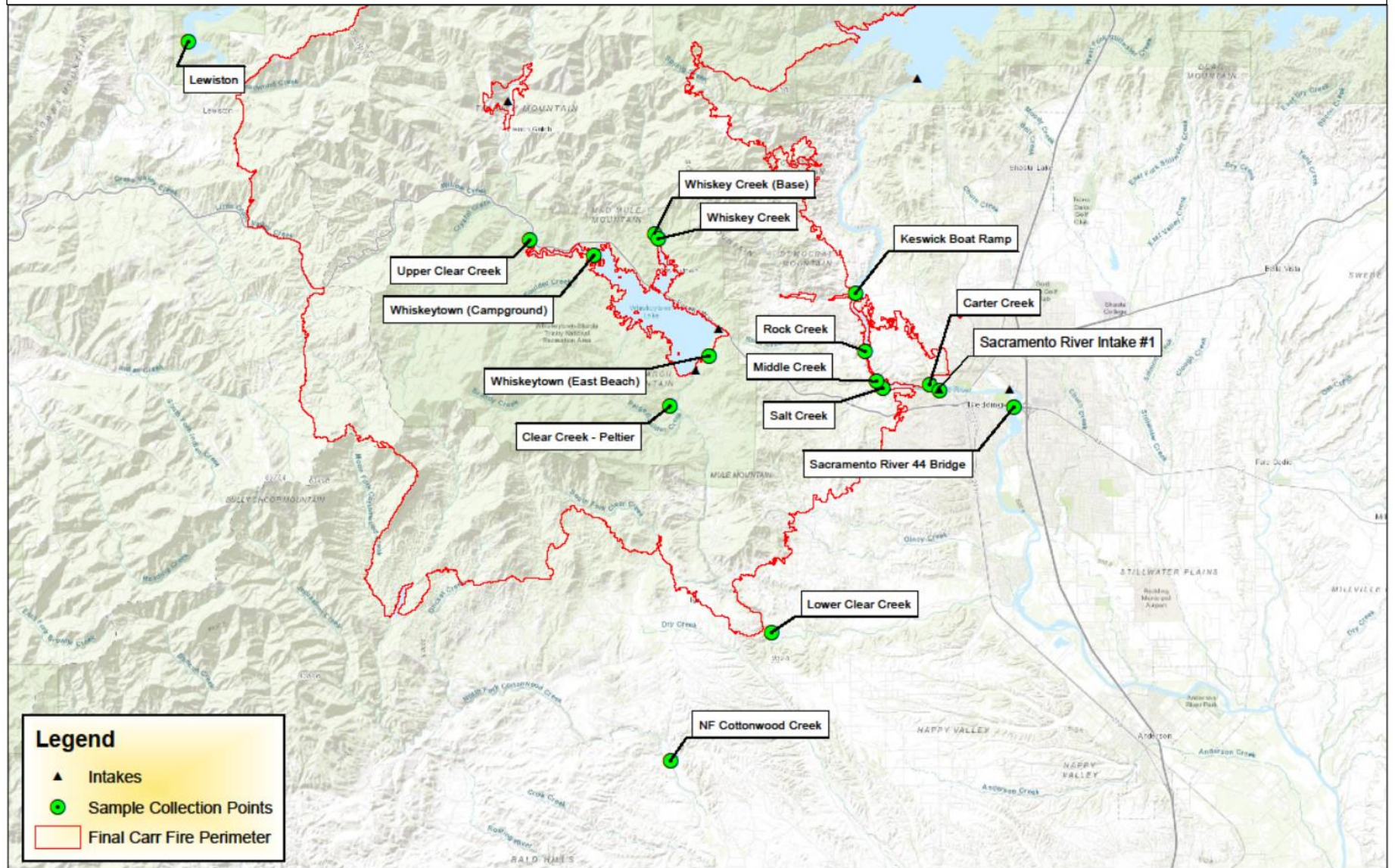


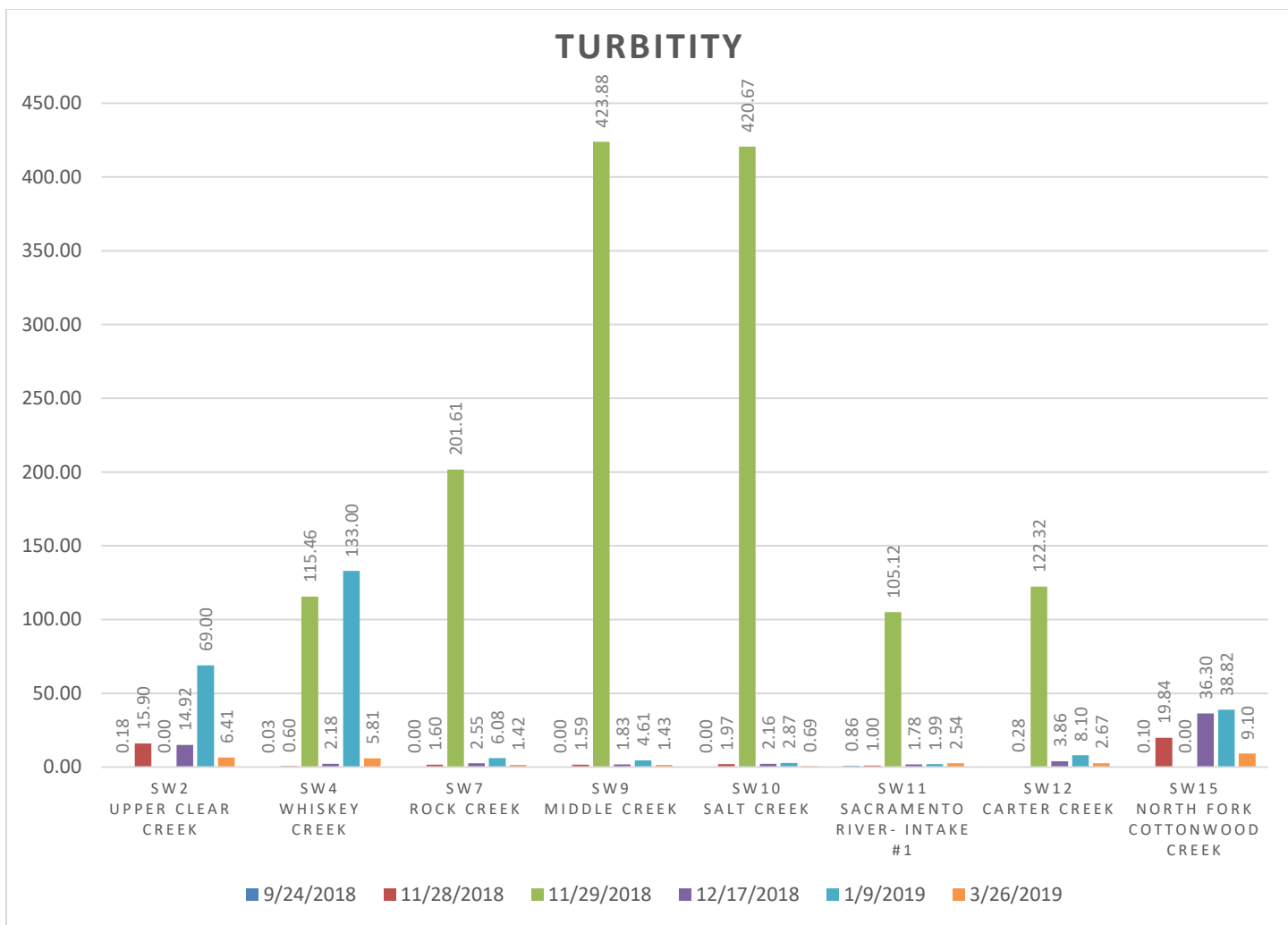
3. CARR FIRE SURFACE WATER MONITORING (Site 2 - Whiskey Creek)

- Approximately 230,000 acres burned during the Carr Fire.
- Water quality monitoring implemented to assess impacts on surface waters.
- Monitoring locations selected to assess impact on spawning, migration, and domestic water supply beneficial uses.
- Results showed elevated concentrations of total and dissolved aluminum and iron and elevated turbidity.
- Area soils have naturally elevated levels of aluminum and iron.
- Results are indicative of sediment transport.
- Impractical to implement BMPs to control sediment and erosion in a vast expanse of fire area due to steep terrain and soil composition.

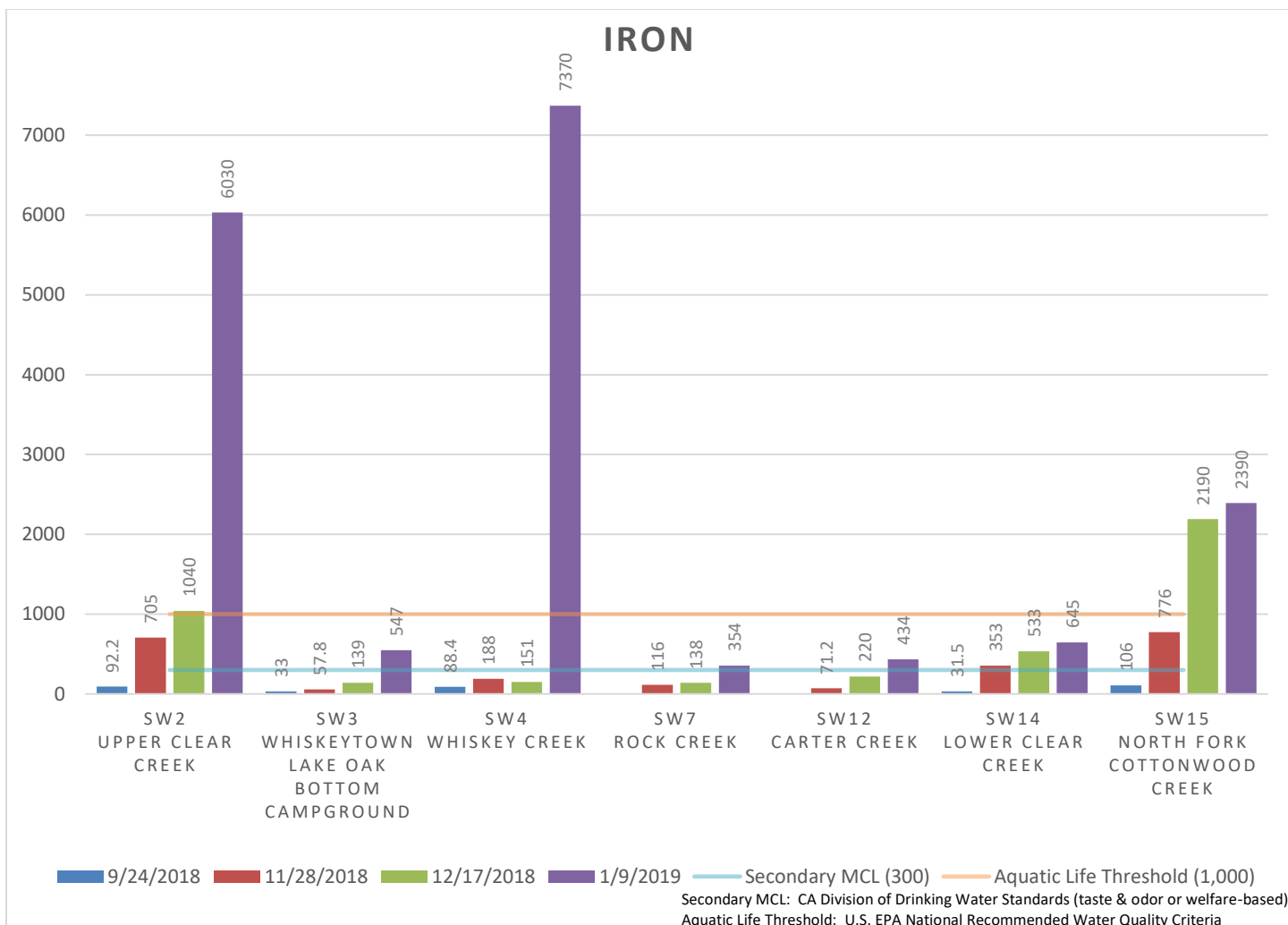
MONITORING CONSTITUENTS
Nutrients: Ammonia, Nitrate, Nitrite, Orthophosphate (as P), Total Kjeldahl Nitrogen (TKN), Total Phosphorus
Metals (total): Al, As, Cd, Cr, Cu, Fe, Pb, Mn, Hg, Ni, Se, Zn
Metals (dissolved): Al, As, Cd, Cr, Cu, Fe, Pb, Mn, Hg, Ni, Se, Zn
Polycyclic Aromatic Hydrocarbons (PAHs)
Alkalinity, Hardness, Specific Conductance, Settleable Solids, Sulfate, TDS, TOC, TSS, Turbidity
Field Measurements: Dissolved Oxygen, Electrical Conductivity, pH, Temperature, Turbidity

Carr Fire Water Quality Monitoring Locations



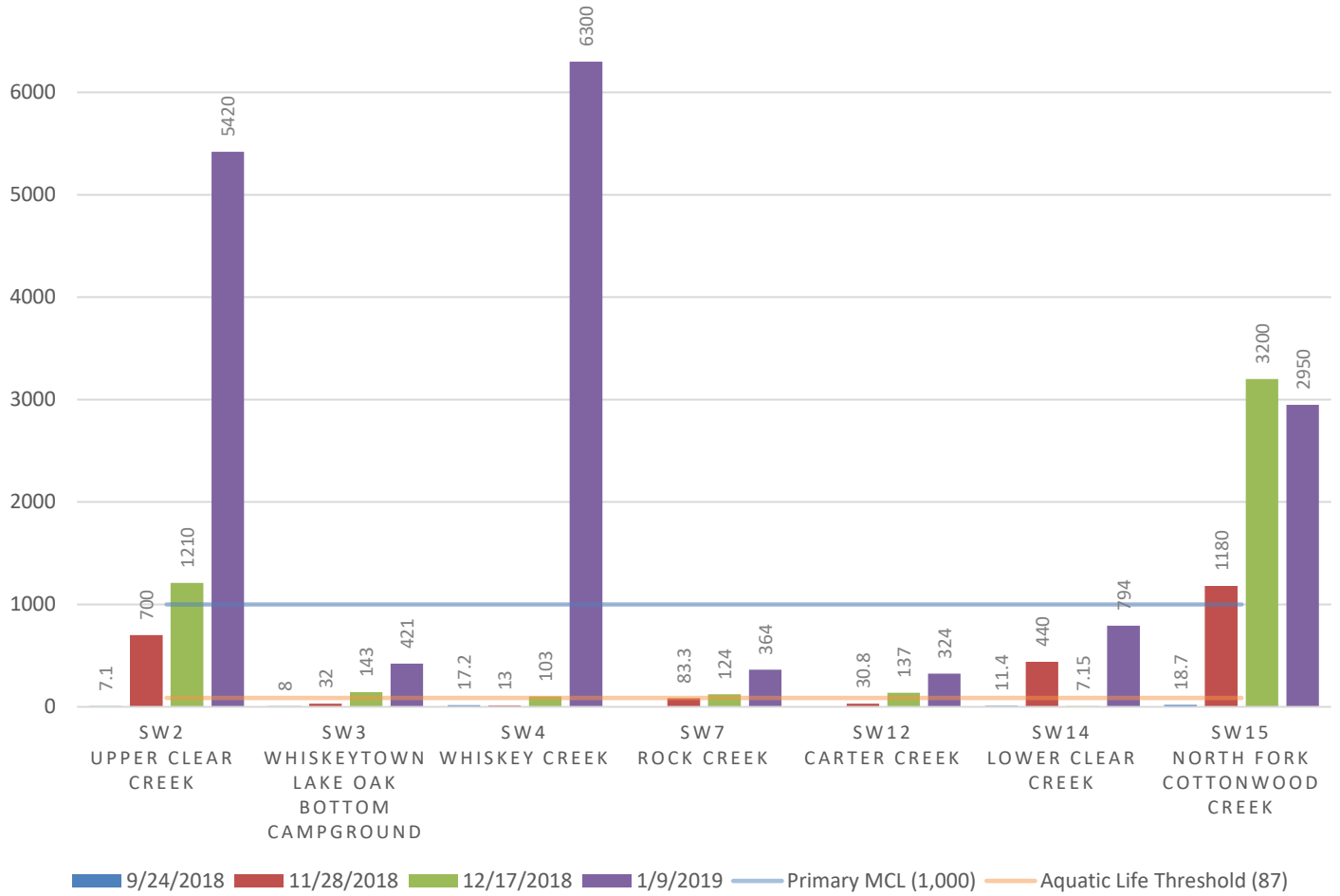


***Elevated turbidity at confluence of Rock Creek and Sacramento River
29 November 2018***



***Elevated turbidity, aluminum, and iron measured at Whiskey Creek
9 January 2019***

ALUMINUM



Primary MCL: CA Division of Drinking Water Standards (health based + technology & economics)
 Aquatic Life Threshold: U.S. EPA National Recommended Water Quality



Whiskey Creek Culvert
Fall 2018



Whiskey Creek Culvert Failure
February 2019

4. CARR FIRE MITIGATION PROJECT (Site 3 – Carter Creek)

- The Carr Fire burned steep slopes in Carter, Rock, Middle, Salt, and Jenny Creeks near the critical spawning and rearing habitat of threatened and endangered Salmon and Steelhead Trout (Map). There are two water district intakes (Redding and Bella Vista) also immediately downstream of the burn area. The Carr Fire burn areas have the potential to discharge sediment and other pollutants in storm runoff at levels that can impact threatened fish and other beneficial uses including drinking water systems in the Redding area.
- Erosion and Pollutant Control Grant Project: This grant is for the purpose of conducting erosion control activities on three hundred eighty-one (381) acres of suitable hillslopes to protect the beneficial uses of the Sacramento River and drinking water intakes from excessive sediment runoff to watercourses within the Rock Creek, Middle Creek, Salt Creek, Carter Creek, and Jenny Creek watersheds in and around the 2018 Carr Fire perimeter. A total of 4.3 million dollars (Water Boards) has been allocated for erosion control implementation between September 2018 and September 2021.
- Project implementation: Acres of moderate to high severity burn slopes (approximately 20% to 40% slope) near Class I streams = 1,640 acres. Acres under access agreement = 1,350 acres. Erosion control measures include hydroseeding, straw application, culvert improvement, and other measures. Acres treated to date = 626 acres. Culvert improvement designs are complete. Assessment monitoring is underway. Depending on watershed conditions, implementation and assessment activities will continue to 2021.

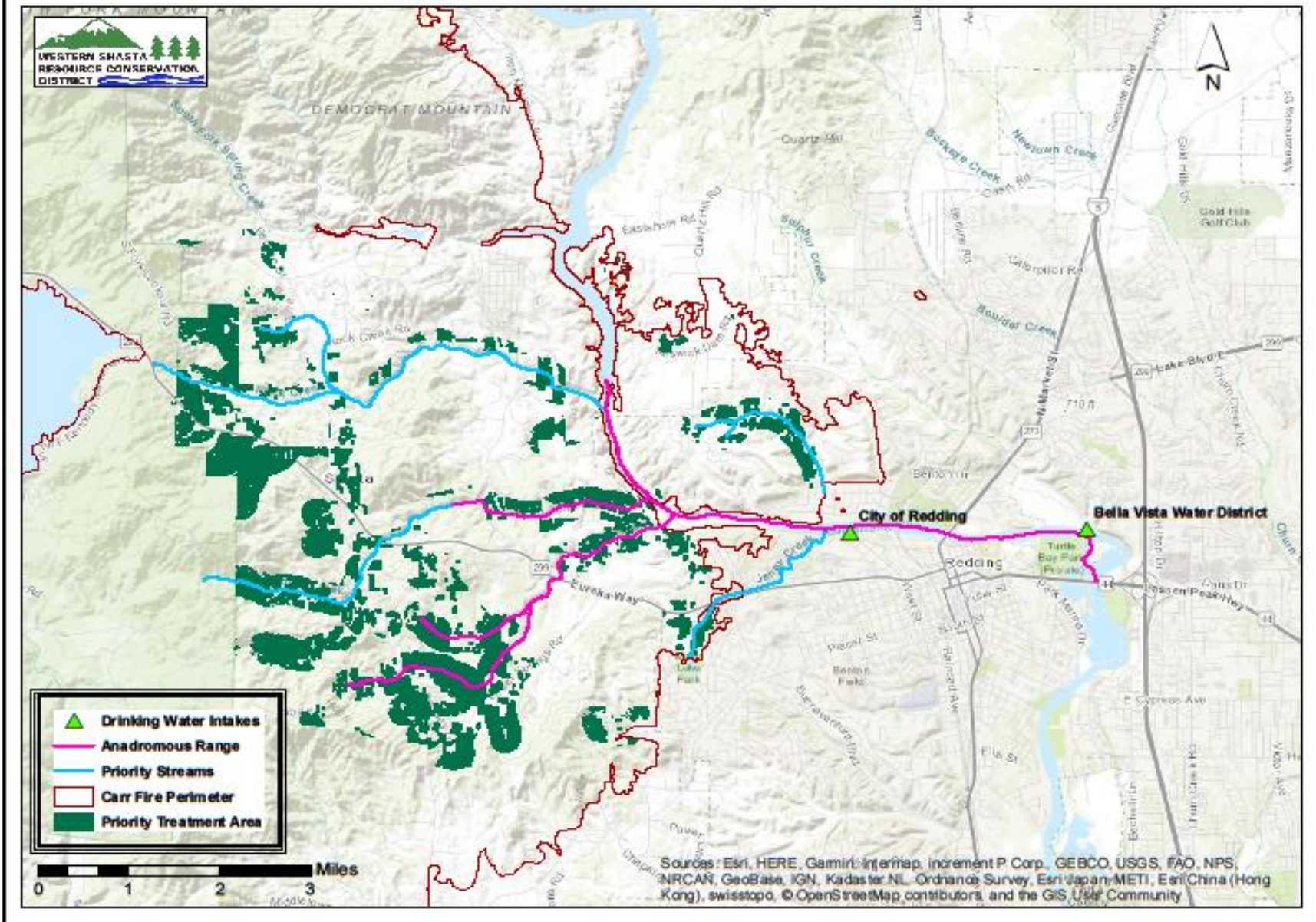


Hydroseed treatment



Hand applied straw treatment

Carr Fire Pollution Mitigation Project



Western Shasta RCD - April 16, 2019



***Before straw treatment Carter Creek
November 2018***



***Hand applied straw and seed treatment Carter Creek
November 2018***



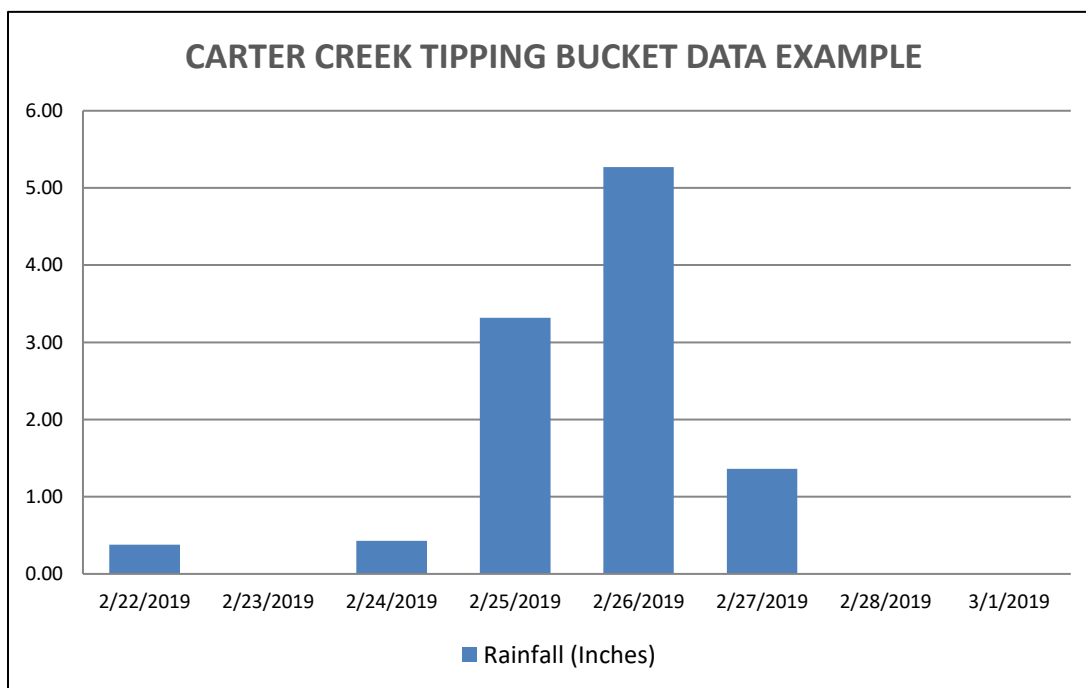
***Hand applied straw and seed treatment Carter Creek
February 2019***

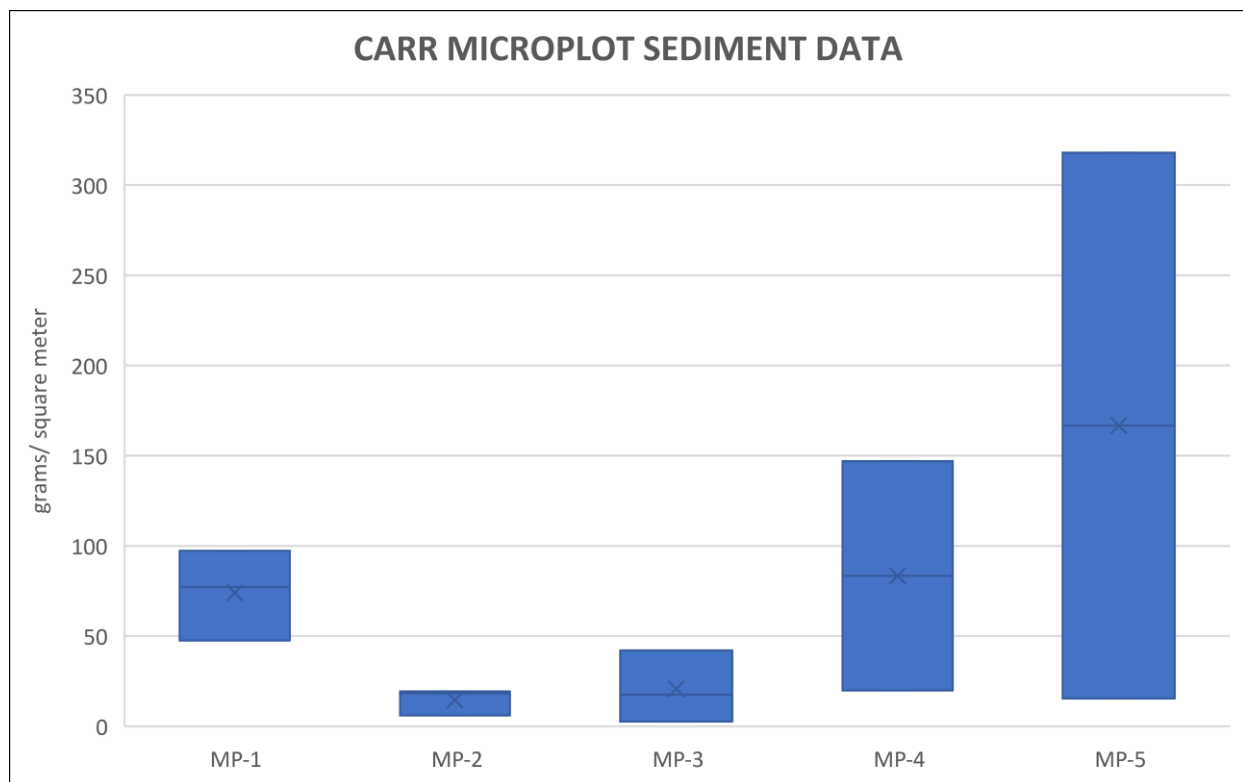
Project Effectiveness Assessment Methods:

- Tracking treated acreage
- Photo monitoring of vegetation and erosion features on treated and untreated sites
- Soil type and slope measurements
- Microplots to assess sediment discharge by overland flow
- Quadrat grid transects to measure vegetation growth and coverage
- Project area rainfall intensity measurements using tipping buckets



*Microplot with runoff catchment basin
Carter Creek*





MP-1 – No treatment (bare soil), Carter Cr. (lower watershed)
 MP-2 – Hand straw treatment, Carter Cr.
 MP-3 – Hydroseed treatment, Carter Cr.
 MP-4 – Hydroseed treatment, Whispering Woods (upper watershed)
 MP-5 – No treatment (bare soil), Whispering Woods

Preliminary results based on limited data suggest:

Vegetation growth (soil stabilization) is faster and denser in treated areas than in untreated areas. Hand applied straw generally shows faster plant growth and better erosion protection than hydroseeding. Natural grass growth is better than expected in some low elevation, moderate burn areas. Rainfall totals and intensity are generally higher in the western project area. Sandy soil (decomposed granite) in the western area is more prone to erosion by dispersed overland flow than soils in the eastern area. Limited microplot data show approximately 50% less sediment erosion from overland flow on hydroseed treated slopes, and 75% less for straw treatments during larger storm events. Little rill or gully formation has been observed on treated slopes. This suggests treatments may have also reduced development of concentrated flow pathways that can generate chronic sediment discharge. Initial results suggest reduced erosion and accelerated stabilization in treated areas.